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The scope of prenatal therapy in severe rhesus hemolytic disease

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In the treatment of rhesus hemolytic disease, blood transfusion of babies still in utero has become established for the removal of life threatening anemia. In Hamburg-Eppendorf, prenatal blood substitutions have been carried out since 1966 and, so far, **252 transfusions in 130 fetuses have been successful. The success rate amounts to 53%.** If one excludes the children who at the time of their first transfusion already showed ascites and hence were treated too late, then among 91 transfused children 56 (61.5%) survived. As prenatal transfusions carry a risk, especially for the fetus, we should attempt to answer the following questions:

1. **Are prenatal transfusions warranted in the presence of existing hydrops?**
2. **At what amniotic fluid bilirubin values are such prenatal procedures unsuccessful?**
3. **Is the technical risk of prenatal transfusion before the 27th week unacceptably high?**

Up to now, 39 babies, whose ascites was aspirated at the time of their first transfusion, have received as many as 4 transfusions (Fig. 1). The earliest successful transfusion was in the 24th week.
13 children survived. The amount of ascites ranged from 1 to 200 mls. It was rarely possible to remove enough of the ascites to prevent dilution of the transfused blood in the babies' abdomen. According to our observations, the amount of ascites aspirated at the first transfusion correlates with the prognosis (Tab. I).

Curriculum vitae

H. Schultze-Mosgau, *born in Kiel in 1933. Studied medicine in Marburg, Innsbruck and Kiel where he took his state exam in 1960. Accepted to medical degrees in 1962. Was assistant at the university surgical clinic of Kiel until 1963. Was then scientific assistant at the university women's clinic of Mainz. Since 1965 has been employed at the university women's clinic of Hamburg-Eppendorf. Became specialist in obstetrics and gynecology in 1968. Appointed as university lecturer in 1970.*

The prospects of producing a living and healthy baby is much larger when the amount of ascites is under 5 mls than when it is greater than 5 mls.

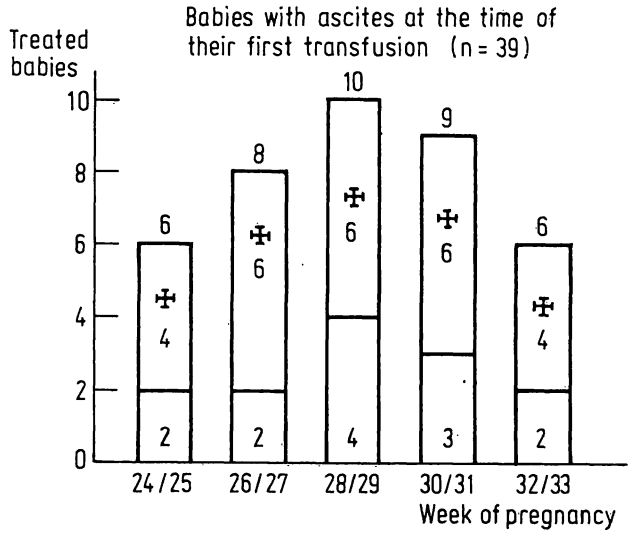

Fig. 1. Babies with ascites at the first transfusion (n = 39).

Tab. I. Ascites at the first prenatal transfusion

Amount of ascites	living	dead	n
under 5 mls	11	7	18
5 mls and more	2	19	21
	13	26	39

Tab. II. Severity of the rhesus hemolytic disease and ΔE_{450} in the amniotic fluid.

ΔE_{450} 0.4—0.499: 14 babies (5 lived)

a) 6 Hydrops (all died)
b) 8 No hydrops (5 healthy, 3 dead)

ΔE_{450} 0.5—0.599: 6 babies (2 lived)

a) 4 Hydrops (1 healthy, 3 dead)
b) 2 No hydrops (1 healthy, 1 dead)

ΔE_{450} 0.6 and higher: 12 babies (1 lived)

a) 11 Hydrop (1 C. P., 10 dead)
b) No hydrops (1 dead)

Basically, however, these results show that prenatal treatment is warranted even in children with already existing ascites.

We got the following results to the question at which amniotic fluid bilirubin values prenatal transfusions are unsuccessful (Tab. II).

Out of 32 babies in whom amniotic fluid bilirubin values of 0.4 and higher were demonstrated, 21 showed a generalised hydrops at the time of birth. 8 children survived, 2 despite their hydrops. 19 of the dead children had hydrops at the time of birth. The cause of death in the children not affected by hydrops was, in most cases, extreme prematurity. Although babies with bilirubin levels from 0.4—0.6 still have a good change of survival, the prospects, when the values are over 0.6, are very poor. SCHREINER and MARONI [7] got corresponding results.

Tab. III. First prenatal transfusions before the 27th week (36 babies).

living: 17 (47%) (no hydrops)		dead: 19 (53%) before the second prenatal transfusion: 9 (7 hydrops)
4	ascites at the time of the first transfusion	6
0.339 (0.20—0.589)	ΔE_{450}	0.474 (0.21—1.83)

2 out of 36 babies probably died as a result of the technical operation

Tab. III shows the technical risk of prenatal transfusions before the 27th week.

Out of 36 babies who were transfused for the first time before the 27th week, 17 survived, even though 4 of them already had a few mls of ascites. Of the 19 dead babies, their deteriorating condition was partly the cause of death and in them the average amniotic fluid bilirubin values was 0.474. Nine children died at the time of their second transfusion, 2 of them not having hydrops. In these two cases, death must be attributed to the technical procedure. **The risk, in our experience, therefore comprises about 6%.**

Summary

Prenatal blood transfusion of a fetus established anemia due to rhesus hemolytic disease can be life saving. In Hamburg-Eppendorf 252 transfusions in 130 babies have so far been carried out. **The success rate was 51%.** Out of 39 babies who had ascites at the time of the first transfusion, 13 survived. The amount of ascites aspirated at the first transfusion correlates with the prognosis: The chance of producing a living and healthy child is greater when the amount of ascites is under 5 mls than when it is over 5 mls. Babies with amniotic fluid bilirubin values from 0.4 to 0.6 still have a good chance of survival, whereas the prospects of success with values over 0.6 are very small. The technical risk of prenatal transfusion before the 27th week amounts, according to our observations, to about 6%.

Keywords: Amniotic fluid, bilirubin, hydrops fetalis, intra-uterine transfusion, rhesus hemolytic disease.

Zusammenfassung

Grenzen der pränatalen Therapie bei schwerer Rh-Erythroblastose

Die pränatale Bluttransfusion kann bei einer ausgeprägten fetalen Anämie infolge einer Rh-Erythroblastose lebensrettend sein. In Hamburg-Eppendorf erfolgten **bisher 252 intrauterine Transfusionen bei 130 Kindern. Die Erfolgsrate beträgt 51%. Bei 39 Kindern bestand z. Zt. der ersten Transfusion ein Ascites. 13 Kinder überlebten.** Eine prognostische Aussage hat die Menge des bei der ersten Transfusion aspirierten Ascites: Bei einer

Ascitesmenge unter 5 ml ist die Chance zu lebenden und gesunden Kindern zu kommen größer als bei Ascitesmengen über 5 ml. Kinder mit Bilirubinwerten von 0,4—0,6 im Fruchtwasser haben noch gute Überlebenschancen, dagegen sind die Erfolgsaussichten bei Bilirubinwerten über 0,6 sehr gering. Das technische Risiko der praenatalen Transfusion vor der 27. Woche beträgt nach den eigenen Beobachtungen etwa 6%.

Schlüsselwörter: Fruchtwasser und Bilirubin, Hydrops fetalis, intrauterine Transfusion, Rhesus-Erythroblastose.

Résumé

Limites de la therapie prenatale dans les cas d'erythroblastose Rh grave

La transfusion sanguine prénatale peut sauver la vie en cas d'anémie foetale aigüe, conséquente à une érythroblastose Rh. A Hamburg-Eppendorf, on a effectué jusque là **252 transfusions intrautérines à 130 enfants. Le taux de succès est de 51%. 39 enfants avaient de l'ascite au moment de la première transfusion, 13 survécurent.** La quantité de l'ascite aspirée à la première transfusion possède une valeur prognostique: La chance de naissance d'enfants vivants et sains est plus grande lorsque cette quantité d'ascite est inférieure à 5 ml. Les enfants ayant des valeurs de bilirubine de 0,4—0,6 dans le liquide amniotique ont encore de bonnes chances de survie; par contre, celles-ci sont très réduites pour les valeurs de bilirubine supérieures à 0,6. Le risque technique de la transfusion prénatale avant la 27ème semaine s'élève, selon nos propres observations, à environ 6%.

Mots-clés: Erythroblastose Rhesus, hydrops fetalis, liquide amniotique et bilirubine, transfusion intrautérine.

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